

CLAIMS

1. A surface treatment apparatus for generating plasma by a pair of plasma generating electrodes in a casing having said pair of plasma generating electrodes, a raw-gas inlet and a substrate supporting table, plasma ionizing the raw gas and plasma processing a surface of said substrate, which is mounted on said substrate supporting table; characterized in that

said casing is partitioned to two chambers, that is, a plasma generating chamber provided with said plasma generating electrodes and a substrate processing chamber provided with said substrate supporting table;

said substrate processing chamber communicates with said plasma generating chamber through at least one plasma vent; and

charged-particle-excluding means is provided in and between the vicinity of said plasma vent and the vicinity of said substrate supporting table.

2. A surface treatment apparatus according to claim 1, wherein high-frequency electric power is inputted to said plasma generating electrodes.

3. A surface treatment apparatus according to claim 1 or claim 2, wherein said charged-particle-excluding means is disposed so as to cross said plasma and comprises a

conductive member having at least one plasma passing hole,
to which voltage is applied.

4. A surface treatment apparatus according to claim 3,
wherein said conductive member comprises a mesh-shaped or
5 a grid-shaped conductive sheet.

5. A surface treatment apparatus according to claim 1
or claim 2, wherein said charged-particle-excluding means
comprises a pair of electrodes that are disposed so as to
interpose plasma flow, which is spurted from said plasma
10 vent, therebetween.

6. A surface treatment apparatus according to any one
of claims 1 to 5, wherein said charged-particle-excluding
means comprises a magnetic field, in which a line of
magnetic force acts in a direction orthogonal to said
15 plasma flow.

7. A surface treatment apparatus according to any one
of claims 1 to 6, wherein said plasma vent has a required
orifice shape or a nozzle shape.

8. A surface treatment apparatus according to any one
20 of claims 1 to 7, wherein said raw-gas inlet defines an
opening on a side face of said plasma vent.

9. A surface treatment apparatus according to claim 3
or claim 6, wherein said charged-particle-excluding means
constitutes a part of said plasma vent.

25 10. A surface treatment apparatus according to claim 1,

wherein said plasma vent has a circular section.

11. A surface treatment apparatus according to claim 1,
wherein said plasma vent has a slit shape.

12. A surface treatment apparatus according to claim 1,

5 wherein said substrate is given with electric potential.